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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Stefan Helgee

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EXAMINER

KERNS, KEVIN P

ART UNIT

PAPER NUMBER

1725

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/539,773	Applicant(s) HELGEE ET AL.	
	Examiner Kevin P. Kerns	Art Unit 1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-56 is/are pending in the application.
- 4a) Of the above claim(s) 49-56 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-46 and 48 is/are rejected.
- 7) ☒ Claim(s) 26 and 47 is/are objected to.
- 8) ☒ Claim(s) 25-56 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 June 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/20/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicants' election of Group I (claims 25-48) in the reply filed on March 6, 2007 is acknowledged. Because the applicants did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Drawings

2. The drawings are objected to because Figure 1 includes German text below the x-axis of the graph. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the

Art Unit: 1725

examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

In this instance, the abstract includes the legal terms "comprises", "comprise", "Said", and "means", all of which should be deleted or replaced appropriately.

Claim Objections

4. Claim 26 is objected to because of the following informalities: in the 2nd line, replace "the" with "a" before "joint" to obtain proper antecedent basis. Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1725

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 25, 27-29, 34, 36-44, and 48 insofar as definite (in the absence of a complete translation of the German document) are rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891).

Hundhausen discloses an arc welding process (including pulsed operation) for joining a ferritic spheroidal-graphite (ductile) cast iron component to a steel component under a protective gas mixture, in which the process includes providing a fusible (consumable steel wire) electrode and a protective gas mixture, with the protective gas mixture comprising argon, carbon dioxide, and oxygen; conducting arc welding (using pulsed or corona arc) of the two components to form a weld joint; and providing post-welding treatment via heating or annealing at optimum temperatures and times, as one

Art Unit: 1725

of ordinary skill in the art would have recognized (abstract; and columns 1-3 of German text). Hundhausen does not specifically disclose the ranges of percentages of the argon, carbon dioxide, and oxygen, in addition to the welding parameters set forth in a portion of the dependent claims.

However, Gault discloses a universal shielding gas mixture for gas metal arc welding (GMAW) processes of carbon steels and stainless steels, in which the gas mixture includes about 95% argon, 3% carbon dioxide, and 2% oxygen, and with the arc welding process further including providing a wire having a diameter of 0.045" (about 1.14 mm), providing an arc voltage of 18-40 V and current of 130-300 A, and providing a sufficient wire feed rate, as one of ordinary skill in the art would have recognized and optimized, such that the shielding gas mixture and welding parameters used for welding of carbon steels and stainless steels are advantageous for providing optimum welding conditions that will not alter the carbon content of the weld metal chemistry (abstract; column 1, lines 7-12; column 4, lines 28-67; column 5, lines 1-35 and 44-67; column 6, lines 1-67; column 7, lines 1-19; and Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ferritic spheroidal-graphite (ductile) cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry

Art Unit: 1725

(Gault; column 4, lines 28-64; column 5, lines 8-12, 26-28, and 64-67; and column 6, lines 1-4).

8. Claim 26 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of Takano et al. (US 5,124,527).

Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25. Neither Hundhausen nor Gault discloses the use of two welding wires to produce a weld joint having two layers.

However, Takano et al. disclose an arc-welding method and apparatus, in which the method includes providing two welding wires (1,2,) adjacent each other in a welding zone to produce a weld joint under a gas shield, such that the two welding wires are arranged to produce two layers and are advantageous for producing a high quality weld at rapid welding rates (abstract; column 1, lines 5-11; column 3, line 4 through column 5, line 63; column 6, line 39 through column 9, line 41; and Figures 1, 5, and 7).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ferritic spheroidal-graphite (ductile) cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and

Art Unit: 1725

by further using two welding wires to produce a weld joint having two layers, as disclosed by Takano et al., in order to produce a high quality weld at rapid welding rates (Takano et al.; abstract; column 3, lines 7-10 and 22-68; and column 4, lines 1-8).

9. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of Fawer (US 5,558,791).

Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25. Neither Hundhausen nor Gault discloses the use of nitrogen monoxide within the argon-based gas mixture.

However, Fawer discloses an arc welding method that includes addition of nitrogen monoxide in argon or an argon/helium mixture, such that nitrogen monoxide is advantageous for obtaining a smooth welding bead top surface with a normal penetration profile and secure flank formation, thus achieving reliable root welding (abstract; column 1, lines 40-67; column 2, lines 1-16 and 33-50; and Figures 1-3).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ferritic spheroidal-graphite (ductile) cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and

Art Unit: 1725

by further using nitrogen monoxide, as disclosed by Fawer, in order to obtain a smooth welding bead top surface with a normal penetration profile and secure flank formation, thus achieving reliable root welding (Fawer; abstract; and column 2, lines 39-50).

10. Claims 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of Church (US 4,463,243).

Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25. Neither Hundhausen nor Gault discloses the use of specific amounts of helium in the shielding gas mixture.

However, Church discloses a welding system and method for electric arc welding of steels, in which the arc welding method includes providing a mixture of argon, helium, carbon dioxide, and oxygen, such that the mixture includes 25-60% helium and is advantageous for increasing weld joint penetration and improving weld bead shape with improved weld stability (abstract; column 1, lines 9-38; column 2, lines 32-68; column 3, lines 1-10; column 4, lines 23-68; column 5, lines 1-20; column 8, lines 3-12; column 11, lines 30-40 and 62-68; column 8, lines 1-4; and Figures 1 and 4).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ferritic spheroidal-graphite (ductile) cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding

Art Unit: 1725

carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and by further using 25-60% helium in the mixture, as disclosed by Church, in order to increase weld joint penetration and improving weld bead shape with improved weld stability (Church; column 2, lines 39-60; and column 4, lines 23-34).

11. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of De Vito et al. (US 4,645,903).

Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25. Neither Hundhausen nor Gault discloses a free electrode length of at least 15 mm.

However, De Vito et al. disclose a gas metal arc welding process in the presence of a gas mixture of argon, oxygen, and carbon dioxide, in which the process includes providing an electrode extension (free electrode length) of between $\frac{3}{4}$ to $1\frac{1}{4}$ inches (19-32 mm), such that the free electrode length is advantageous for providing high deposition rates without arc rotation (abstract; column 1, lines 4-8; column 2, lines 5-68; column 3, lines 1-68; column 4, lines 1-52; and Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ferritic spheroidal-graphite (ductile) cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using the universal shielding gas mixture and optimized welding parameters for welding

Art Unit: 1725

carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and by further using an electrode extension (free electrode length) of between $\frac{3}{4}$ to $1\frac{1}{4}$ inches (19-32 mm), as disclosed by De Vito et al., in order to provide high deposition rates without arc rotation (De Vito et al.; abstract; and column 2, lines 23-30).

12. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hundhausen (DE 36 00 813 A1) in view of Gault (US 6,303,891), as applied to claim 25 above, and further in view of Bishel (US 3,778,588).

Hundhausen (in view of Gault) disclose and/or suggest the features of claim 25. Neither Hundhausen nor Gault discloses preheating the ductile cast iron parts to specified temperatures before the arc welding step.

However, Bishel discloses a method of welding ductile cast iron parts, in which the method includes providing a step of preheating the ductile cast iron parts to about 250 degrees Celsius prior to arc welding, such that the preheating is advantageous for preventing the free graphite in the welding electrode from diluting the parent metal of the iron parts in carbon (abstract; column 1, lines 33-39; column 3, lines 27-40 and column 5, lines 36-40).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the arc welding process (including pulsed operation) for joining a ferritic spheroidal-graphite (ductile) cast iron component to a steel component under a protective gas mixture, as disclosed by Hundhausen, by using

Art Unit: 1725

the universal shielding gas mixture and optimized welding parameters for welding carbon steels and stainless steels, as taught by Gault, in order to provide optimum welding conditions that will not alter the carbon content of the weld metal chemistry, and by further using a step of preheating the ductile cast iron parts to about 250 degrees Celsius prior to arc welding, as disclosed by Bishel, in order to prevent the free graphite in the welding electrode from diluting the parent metal of the iron parts in carbon (Bishel; abstract; and column 3, lines 27-40).

Allowable Subject Matter

13. Claim 47 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. The following is a statement of reasons for the indication of allowable subject matter: the prior art fails to teach or suggest the arc welding method that includes all steps set forth in independent claim 25, and further including an additional step of cooling the joined parts in diatomaceous earth after the arc welding step (dependent claim 47).

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kevin P. Kerns whose telephone number is (571)

Art Unit: 1725

272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin P. Kerns *Kevin Kerns 3/31/07*
Primary Examiner
Art Unit 1725

KPK
kpk
March 31, 2007